MEMO Number TSR05
DATE: 2023-02-125
TO: Dr. LaBerge
FROM: UHDRTZ
SUBJECT: Progress report for February 2023

1 INTRODUCTION

This memo provides the progress report required by Capstone. This report covers February 11 to February 25.

2 COMPLETED WORK

We have translated the current C++ code completely into Rust. This includes opening the program in full screen borderless mode. A video stream is displayed and can be rotated with data acquired through bluetooth, provided by the rotary crank and arduino duo.

We have looked into the haptic feedback section of the project. Our current plan has us using a worm gear to connect the rotary encoder and the DC motor together. However, we have noticed that space is quite limited within the crank housing. This also seems to be an objective outside of our direct expertise. Therefore this requirement will be taking a sideline to the Rust implementation.

3 WORK EXPECTED DURING NEXT PERIOD

Our current objectives are as follows: The audio that should be playing as the crank is moved needs to be fixed so that it will actually play. There needs to be a GUI so that there can be a way for the customer to change the graphical settings of the output. This includes Hue, Saturation, and Color of the output image. This is the implementation of the Effects Box project. A second GUI will be created for applying specific mask types and moving the output image around the screen so that the output can be customized to the customers liking. Lastly, work on the user guide had begun. We will have a fully fleshed out user manual for anyone who may be setting up this art installation in the future.

So far we have promising prototypes that indicated implementing every aspect of the effects box in code will be possible.

4 ISSUES FROM PREVIOUS REPORTS

The team was able to 3D print a housing for the arduino which will help with robustness. Any further, more complex 3D printing will continue to be a challenge for our team.

GLOBAL ENGINEERING

Consider a non-profit, non-governmental organization (NGO) that is considering a project to provide electrical power for a small rural village in an underdeveloped part of the world.

1) **As we discussed in CMPE349, systems engineering is bigger than just getting a specific device to work, and includes "a collection of elements (e.g., hardware, software, people, facilities and procedures) organized to accomplish some common objectives." Identify several additional considerations might be necessary in the design of the project, if the goal is to provide a long-term solution to the village's energy problems.**
    a) To start, any cultural aspects need to be considered. If the ground we are building on is appropriate for that type of project. We need to be considerate of what the village wants us to do. Second is making sure that this energy source can be maintained. What if this is not in an area that is easily accessible? How will we implement systems to make sure this project lasts long term? Will this be clean energy? If this is a long term solution, a renewable energy source is probably the best. Another consideration is how expandable this energy source is? If it were to be truly long-term it would need to handle the expansion of the village itself.

2) **Taking the IEEE Code of Ethics as a baseline, what suggestions might you make about such considerations in the design of the project. In particular, what cultural or environmental impacts might have to be considered? If you wish to assume a particular culture when making these considerations, please identify it.**
    a) If the assumption is made that the engineers involved are American and are making something for any other culture or global entity some of the most impactful sections of the IEEE code of ethics is that of Section II. This section states that the engineers shall treat all persons fairly, in a non-discriminatory manner, and will avoid injury to others. Of these considerations the non-discriminatory piece is most important as creating something for another culture and group of people is to be done in a way that does not break any cultural or societal norms that differ from those in which the engineers observe. More specifically, the largest cultural and environmental impacts are those of the locals that would be directly impacted, and care must be taken to show that their needs, and their methodologies are respected. This could be along the lines of tools used to build or fix things, or times in which people work and how they do. Additionally the system could enforce a view that is more in line with the creators cultures that doesn't align with that of the users cultures. In terms of environmental impacts, the use of locally sourced materials and goods allows the users to create, maintain, and support themselves when needed. This also means that inclusion of practices or materials that could harm the environment or the people (through water or food supplies) should be avoided, unless the users would be specifically able to use things as they are intended.

3) **Again using the IEEE Code of Ethics as a baseline, are there ethical considerations for long term operation and maintenance of the project? If so, what are they and how might they be addressed?**

a) There are long term considerations for all engineering projects. In terms of operation and maintenance, the smallest things can sometimes have the largest impact on how the product is used and fixed. Some things that could be acceptable in the location that created the system, like that of disposing of materials that could be waste, could have major impacts if not disposed of properly. This could be due to a lack of infrastructure in the deployed location, or it could just be down to purely a cultural difference. Using the IEEE Code of Ethics it is said to avoid unlawful conduct, and to protect all persons. Ignoring this in the long term still is a violation of this code, and must be addressed through solid communication with the users and constraints must be understood by both parties to create a functional system that is also long lasting and without clash of the designs to the users themselves.

4) **How might the considerations of 1), 2), and 3) influence the development of an Operational Scenario Diagram for the system. Remember that the OSD depicts "life cycle" events, which might include manufacture, storage, training, installation, operation (i.e. the Mission Scenario), post-operation, maintenance, upgrades and replacement or retirement.**
    a) The manufacturing of the system should be done in a way that reduces environmental impact for those affected, and be sustainable. As mentioned before, locally sourced parts are generally better as they provide more familiarity and ease of maintenance. Also, the various considerations mentioned will impact not only the life cycle events themselves, but where they take place. People in the developed parts of the world should take their privilege into account and not create a barrier to entry for those seeking to learn about and use the system. Storage and training should take place in the target location, rather than across the world somewhere. Furthermore, the Operational Scenario Diagram itself should be developed in partnership with the engineers or other relevant tradesmen that will be using the product. This is beneficial because it introduces multicultural work earlier in the design process and can guide the rest of the project.